



Aquarium Professionals Group

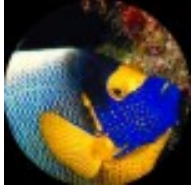
2533 Hartrey Avenue
Evanston, IL 60201

Copyright 2001, All rights reserved.

Author: David Hauser

Ultraviolet Sterilizers & Ozonizers

Part One - Ultraviolet sterilization



Ultraviolet sterilizers and ozonizers can be valuable assets. They may hurt more than help, depending on when and how they're used. In our opinion, both types of devices are often misused or abused, sometimes to the detriment of the natural ecology and biochemical processes in aquaria.

Ultraviolet sterilizers are used to control populations of undesirable microscopic life in an aquarium.

If used properly, they may reduce the chances of fish becoming infected by viruses, bacteria, and some species of protozoa. They can also help to control algae growth by destroying water borne algal spores and micro-algae. As the water passes through a UV sterilizer, it is bombarded with ultraviolet radiation at a specific wavelength (approximately 2537 angstroms) via a mercury vapor lamp which destroys genetic material in the nucleus of microorganisms.

Several factors influence how well an UV sterilizer works. One is the wattage of the lamp used in the sterilizer. Another is the amount of time that water passing through the device is exposed to radiation, called the "dwell" or "contact" time. A third factor is the "turnover" of the entire volume of water to be sterilized. Sterilizers must therefore be properly-sized for the aquarium and for the flow-rate of water passing through them.

Because the effectiveness of a sterilizer is affected by how well the UV light penetrates water in the unit, turbidity of the water is another factor affecting performance. Water passing through the UV sterilizer should be clean and clear. Many UV sterilizers use a quartz sleeve to ensure the bulb operates at the correct temperature and to protect the lamp. Ultraviolet light is a catalyst in many chemical reactions and minerals will tend to collect on the sleeve. This sleeve (or the lamp itself in non-quartz-sleeve units) must be kept clean or UV light will not penetrate the water passing through the device.

Lamp age also affects performance. The bulbs should be changed approximately every 6 to 8 months depending on the model of sterilizer and the lamp type used. Unfortunately, we have seen sterilizers used in many applications that did not apply any of these factors correctly, resulting in ineffective low levels of radiation dosage.

One fact that is also often over-looked is that the lamp inside an ultraviolet sterilizer gets quite warm during operation. We've seen over-sized UV sterilizers in use on some aquariums. While the sterilizers in these situations may have been doing their job, those aquaria not equipped with a chiller exhibited very high temperatures due to the additional heat produced by the UV sterilizer lamp(s). In nearly all of these cases, the higher water temperatures seemed to cause fish to exhibit signs of stress which led to disease factors anyway.

Another danger of using a sterilizer that is too large for a given application is that it may kill many beneficial microbes or have a negative affect on larvae of of desirable organisms, particularly in reef aquaria, which leads us to our next subject. The use of ultraviolet sterilization in reef aquaria is a controversial topic. Many opponents to the use of UV in reef tanks say that it lowers the population of marine copepods, amphipods and Mysid Crustacea as well as many other microorganisms which serve as natural foods for Cnidarians and other filter-feeding sessile invertebrates, and also contribute to the overall ecology in live coral reef aquaria. Folks in favor of UV use in reef aquaria say that the control of parasites in an environment where most medications cannot be used far outweighs the drawback that it reduces populations of desirable microorganisms.